Job Loss Analysis

ID No: 1263634 **Status:** Closed

Original Date: 05/May/2009
Last Review Date: 12/Feb/2009

Organization:

SBU: GLOBAL MANUFACTURING
BU: ALL
Work Type: Technical (Process Engineering)
Title (Work Activity): Hydroprocessing Reactor Startup
Site/Region:

Personal Protective Equipment (PPE)	Selected	Comments
Safety Shoes	Y	
Hard Hat	Y	
Safety Glasses	Y	
Fire Resistant Clothing	Y	
Goggles	Y	
Supplied Air Respirator - SCBA	Y	
Welding Hood	Y	
Long pants/trousers	Y	
Long sleeve shirt	Y	
Gloves	Y	
Caution Tape	Y	
Personal Gas Monitor	Y	
Additional Task Specific PPE		
Other		

Reviewers

Reviewers Name	Position	Date Approved
Johansen, Michelle L (MLMJ)	Manager	05/May/2009
Ready, Ken S (KRDK)	Manager	12/Dec/2008

Development Team

Development Team Member Name	Primary Contact	Position
Mccord, Cameron A. (CMRN)	Y	Engineer
Ivey, Daniel D. (DDIV)	N	Head Operator
Johns, Jeff W. (JEWJ)	N	Lead
Mcdaniel, Douglas G. (MDOG)	N	Subject Matter Expert
Salyer, Mike D. (SAMD)	N	Subject Matter Expert
Souers, Steve A. (SASO)	N	Lead

Job Steps

No	Job Steps	Potential Hazard	Critical Actions
1	Ensure that the start-up procedure is up to date.	1. Personnel fail to heed the critical "do's" and "don'ts" around hydro-processing unit start-ups, causing hazards listed below. 2. This JLA should not be used for hydrocracker 2nd stages, naphtha desulfurizers, or units that are gas-phase sulfided. Doing so could cause misunderstanding, delays and equipment damage.	1a. Review Best Practice HP-014 and the catalyst vendor's recommendations before the Start-Up with affected operators and technical support. Ensure common understanding of how to respond to foreseeable delays and emergencies. 1b. Cross-reference this JLA with the Start-Up procedure after each shift change. 2. Ensure that this unit is a down-flow 2-phase hydrotreater or 1st stage hydrocracker using base metal catalyst and the sulfiding is done liquid phase.
2	Conduct a Pre-Start-up Safety Review (PSSR) before starting process.	1. Unit is not mechanically complete, increasing potential for leaks and delays. 2. Critical instrumentation does not function properly, increasing potential for delays and equipment damage.	1. Conduct a rigorous PSSR, ensuring, among other things, that all flanges are properly made-up and that all equipment can be accessed. 2a. 2a. Review distributed control system for manual inputs. 2b. 2b. Review control valve stroke and instrument behavior, especially reactor skin temperature indications. 2c. 2c. Ensure that necessary alarms are in service. At the start of each shift, conduct LPSA's and review expected Start-Up activities to identify safe hold points.
3	Increase System Pressure.	1. Excess O2 in reactor loop upon introduction of H2 creates potential for detonation. 2. Chloride-laden water in low points creates potential for chloride stress corrosion cracking of flanges and bleeders. 3. Exceed minimum pressurization temperature (MPT) – potential for catastrophic equipment failure. 4. High pressure loop leaks after feed-in, delaying startup and increasing risk of fire.	1. Cycle system pressure with N2 repeatedly and commission recycle gas prior to pressuring with H2 to ensure O2 is less than 2%. 2. Blow down low points repeatedly during N2 pressure testing. 3. Review the MPT limits frequently to ensure that the reactor and separator pressure limits are not exceeded. 4. Pressure system to MPT limits with N2 and H2 to perform rigorous leak check. Ensure bleeders are bull-plugged.
4	Heat Up.	1. Some furnaces are hard to control at low temperatures, causing either of these hazards: Overheating some catalysts before wetting them with oil shortens run span. Excessive heat-up rate could damage catalyst by boiling water too fast. 2. Furnace burners could be extinguished, delaying start-up and potentially causing explosive conditions in box.	1a. Contact catalyst vendor and refer to BIN standards to confirm max allowed temperatures and rates. 1b. Ensure that this information is recorded in the Start-Up procedure. 2. Ensure that all operators are aware of the need to adjust fuel gas minimum flow settings as necessary as burners are added and subtracted. At the start of each shift, conduct LPSA's and review expected Start-Up activities to identify safe hold points.

5	Introduce Feed onto Catalyst.	1. Using cracked stocks during feed-in and ramp-up to on-test conditions increases likelihood of a temperature run-away. 2. Recycle machine stalls during initial catalyst wetting, causing furnace trip and start-up delays. 3. Excessive exotherms during wetting can damage catalyst.	1. Communicate with Operations Planning well ahead of Start-Up that straight-run stocks are required. 2. Coordinate H2 make-up sources to keep recycle gravity near normal operating conditions. 3a. Particularly for hydrocrackers, be prepared to quench heavily and drop system pressure to ensure temperatures stay below 500F. 3b. Maximize feed rate during initial wetting, up to recycle machine circulation limits. 3c. There is no emergency feed-in. There is always time to ensure the plant condition is optimized for feed-in per Best Practices.
6	Sulfiding	1. Hot H2 reduces catalyst metals to inactive form. 2. Excessive exotherm damages catalyst or equipment. 3. Run out of sulfiding agent, delaying start-up and exposing catalyst to damaging conditions. 4. Frequently checking recycle gas increases potential to inhale H2S.	1a. If start-up is delayed for some reason, do not allow unsulfided catalyst to stay above 400F in H2 environment. 1b. Do not allow H2S in recycle to fall to zero. 2. Do not allow H2S in recycle to exceed 2%. High H2S levels provide a reservoir of reactant to release heat if temperatures rise suddenly. 3a. Utilize BIN site sulfiding calculation tools to order appropriate amount. 3b. Ensure that the injection point is lined up to ensure agent cannot go astray. 3c. Track cumulative usage during procedure. Minimize once-through feed and maximize recycle feed as possible, especially during the low-temperature sulfiding. 4. Utilize appropriate supplied air practices when sampling recycle.
7	Switch to Fresh Feed Stocks.	1. Switching abruptly from internally recycled oil to fresh feed can cause a reactor temperature excursion, which can damage equipment. 2. Introducing cracked feedstocks before 72 hrs after completion of sulfiding will shorten the catalyst life.	1. Slowly introduce increasing rates of fresh feed into reactor during high temperature sulfiding. 2. Work with Operations Planning to coordinate supply of straight-run feedstocks. At the start of each shift, conduct LPSA's and review expected Start-Up activities to identify safe hold points.
8	Delay in Other Sections of the Plant Start-up.	1. Inability to maintain H2S in recycle H2 reduces fresh catalyst metals to inactive form.	1. All Start-Up personnel should meet before the event and at the start of each shift to ensure common understanding of events that can proceed in parallel and responses to potential emergencies.